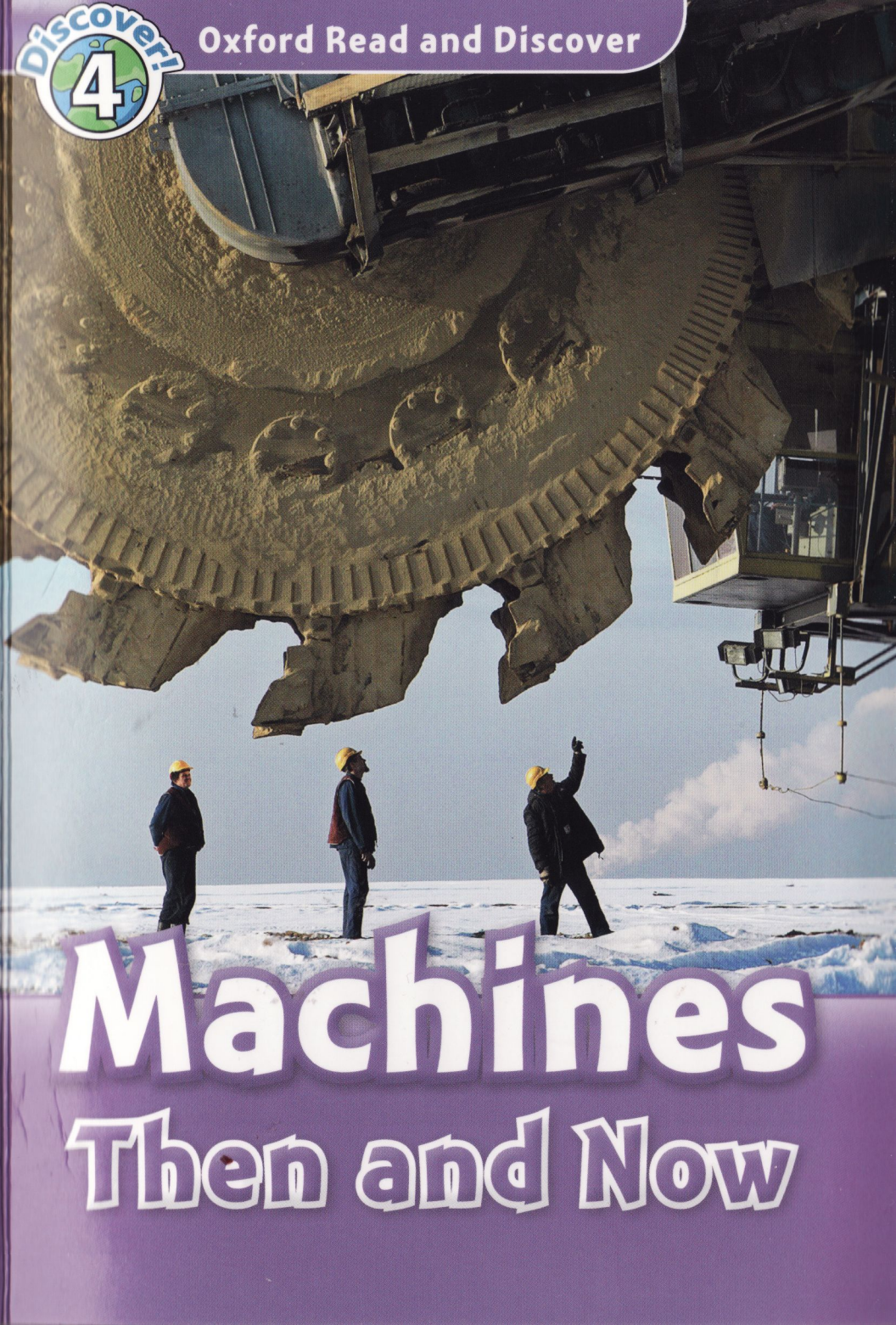
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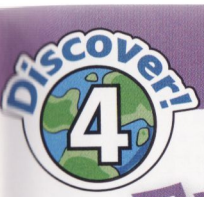

Oxford Read and Discover

Machines Then and Now

Robert Quinn

Contents

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Introduction

Machines make our lives easier. We use them to do work, to travel, to communicate, and to have fun. Some machines are simple, with only one or two parts. Other machines are complex, with many parts that work together.

What are the machines below called?
What do we do with these machines?
Which of these machines do you use?
What other machines do you use?

1 

2 

3 

4 

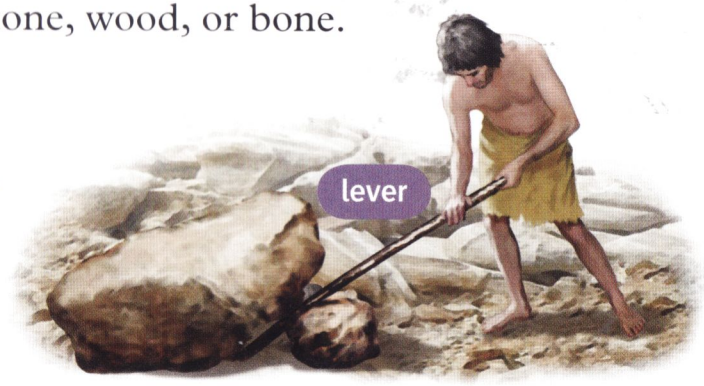
5 

6 

Now read and discover more about machines!

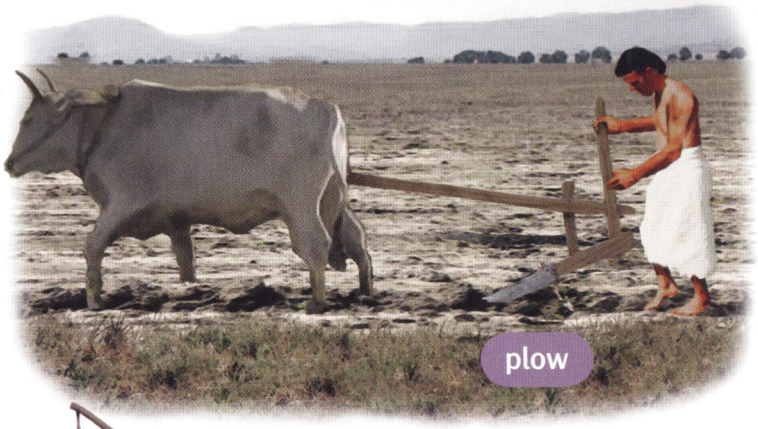
1 The First Machines

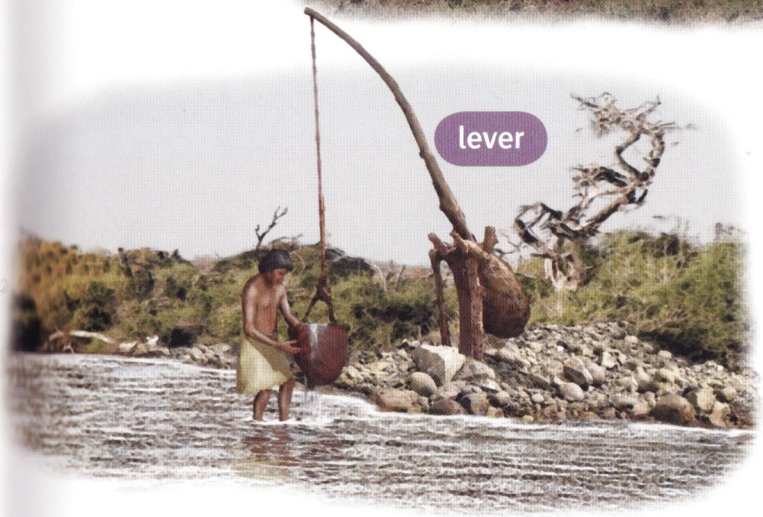
People invented the first machines a long time ago. They were simple tools made of stone, wood, or bone.



About two million years ago people made stone axes with wooden handles. They used these tools to cut wood. People also used stone and animal bone to make knives and arrows. To shoot their arrows they used bows made with long pieces of wood.

People used simple levers to move heavy objects like rocks. They put one end of a long stick of wood under a big rock, and they put a small rock under the stick. When they pushed on the other end of the stick, the big rock moved.



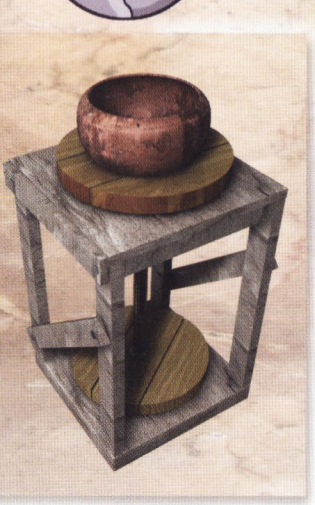


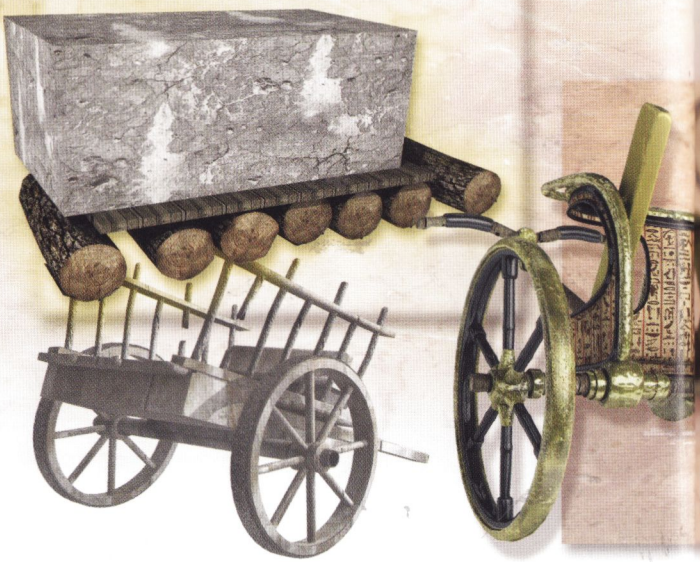
About 7,000 years ago people started farming for food. They invented new machines, like plows, and used animals to make work easier. Some farmers used long levers to get water from rivers. They also built canals to get water for their plants.

About 5,000 years ago people started making metal tools. These tools were better than stone or bone tools.

Go to pages 24–25 for activities.

2 Round and Round





The wheel is one of the most important inventions in history. About 5,500 years ago potters used the first wheels to make clay pots. They put wet clay on a wooden wheel. Then they turned the wheel to make a nice round pot.

Before people had wheels to move heavy objects, they used rollers. The rollers were made from tree trunks. Then people made carts and chariots with wooden wheels. They connected the wheels with a long bar called an axle.

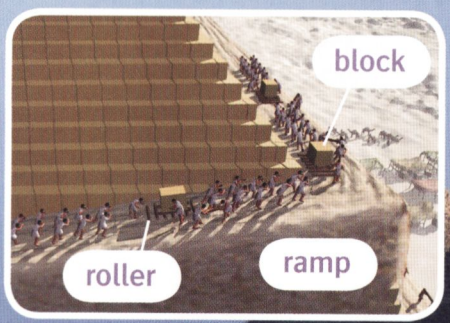
Today there are lots of machines with wheels. We can see wheels on cars, bicycles, and skateboards. There are also wheelchairs for people who can't walk easily. Can you think of more machines that have wheels?

Discover!

The London Eye is a very big wheel. It's 135 meters high! You get a great view of London from the top!

Go to pages 26–27 for activities.

3 Ramps and Cranes

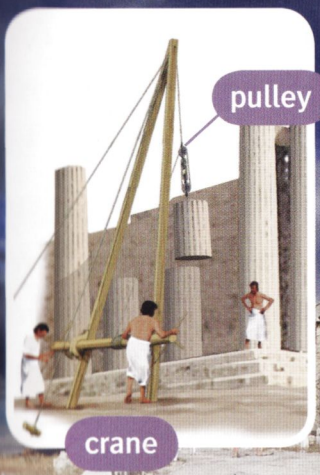


The Pyramids at Giza, Egypt

Ramps are useful because they help us lift objects more easily. More than 5,000 years ago the Ancient Egyptians used ramps to build pyramids. The Great Pyramid at Giza is the biggest pyramid in the world. It's 138 meters high.

The Egyptians used rollers to move large blocks of stone up the ramps. They needed lots of workers because the blocks were very heavy.

The Parthenon in Athens, Greece



About 2,500 years ago the Ancient Greeks used big cranes to build temples. The cranes were made of wood, and they had many ropes and little wheels called pulleys. First the workers tied a rope to a block of stone. Then they put the rope around the pulley. They pulled the rope and lifted the block. The work was easier with cranes, so the Greeks didn't need as many workers as the Egyptians.

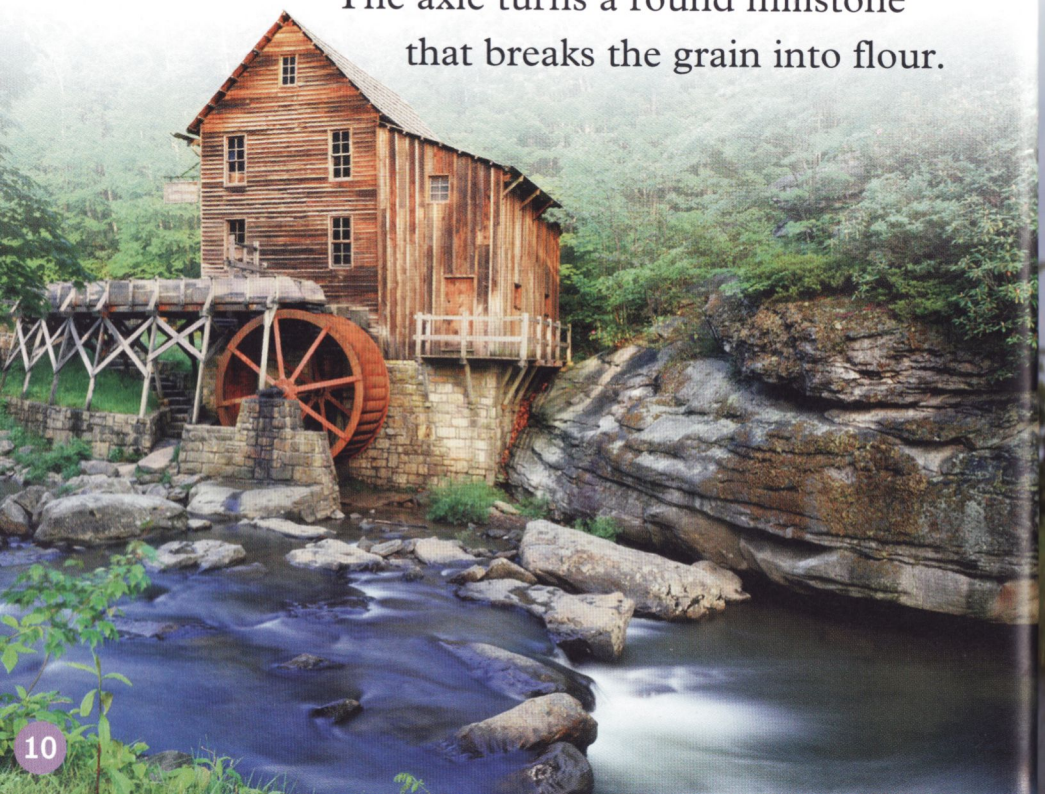
Discover!

We use cranes today to lift very heavy objects. The biggest type of crane is the gantry crane.

Go to pages 28–29 for activities.

4 Water and Wind

Some machines use energy from nature. Watermills use energy from flowing water. Thousands of years ago people built watermills next to rivers. They used the watermills to make flour from grain. Then they used the flour to make bread and cakes. Watermills have a big wheel on the outside. The river turns the wheel. Then the wheel turns an axle inside the watermill. The axle turns a round millstone that breaks the grain into flour.



Windmills use energy from the wind. Hundreds of years ago people started using windmills to make flour. Windmills have long arms with big sails. The wind pushes the sails and turns the arms. Inside the mill, an axle turns a millstone. Windmills are useful in places that don't have big rivers, but they only work when it's windy!

sail

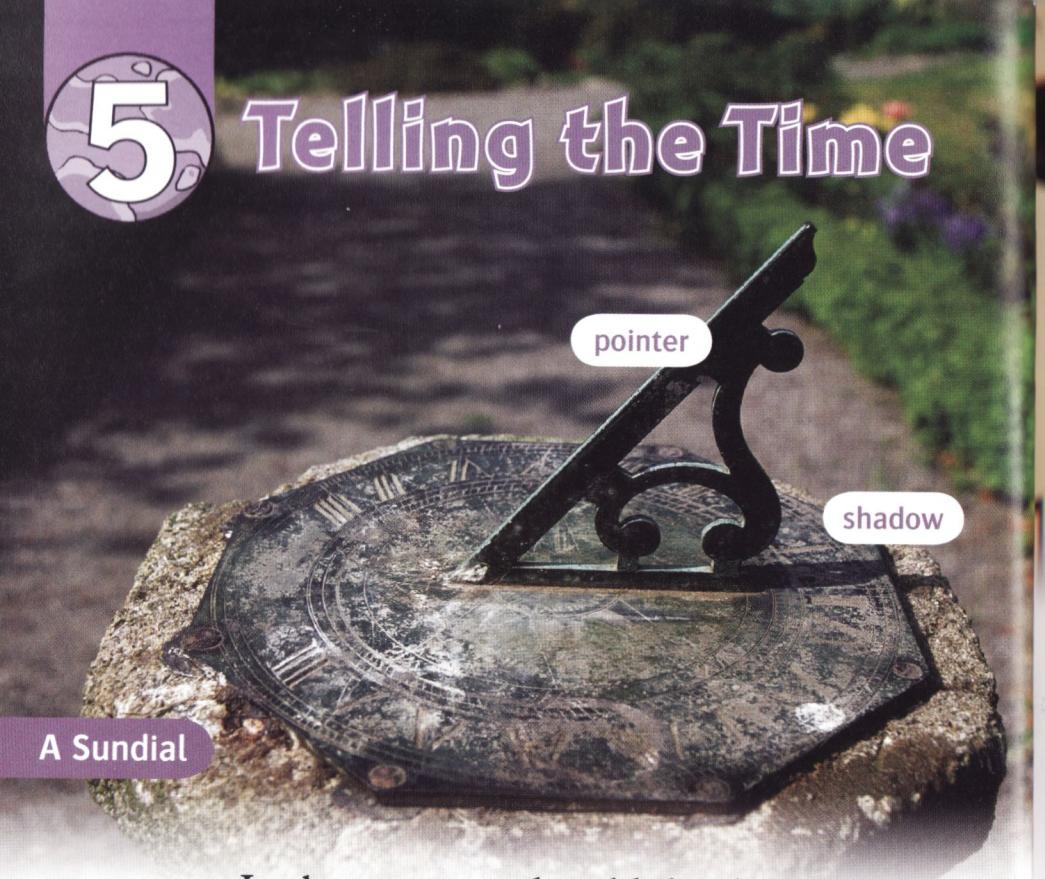
arm

Discover!

Today we use windmills to make electricity. Modern windmills are called wind turbines.

Go to pages 30–31 for activities.

5 Telling the Time



A Sundial

In the past, people told the time in many ways. Thousands of years ago people used sundials. Sundials had a pointer that made a shadow to tell the time. A sundial only worked on sunny days!

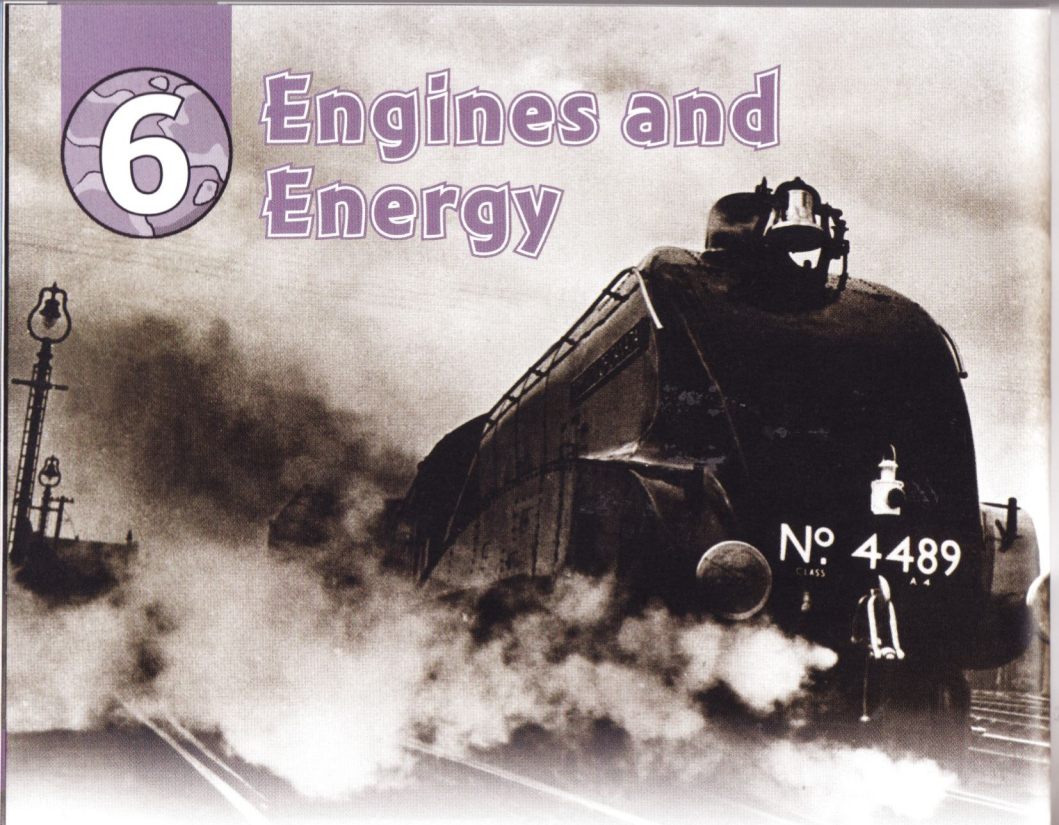
Some people also used water clocks. Simple water clocks had two pots. Water flowed from the top pot to the bottom pot to tell the time. Later, people used sand clocks. These clocks had two glass bubbles with sand inside them.

About 1,000 years ago people invented mechanical clocks with metal gears. Some mechanical clocks have a pendulum to move the parts. Others have metal springs.

Today many clocks are digital. They show the time with only numbers. Digital clocks work with electricity. They usually have electrical cords or batteries. Computers and cell phones have digital clocks, and many people wear digital watches.

Go to pages 32–33 for activities.

6 Engines and Energy



For thousands of years people used animals to do work. Then inventors built steam engines. These engines heated water to make steam. The energy from the steam made other machines work. The first steam engines usually used fuels like wood, coal, or oil.

People used steam engines to power vehicles like trains and boats. Many factories used steam engines to power their machines. This was the beginning of modern industry.

Then people invented new engines that used fuels like oil, gasoline, and diesel. Now we use these engines for vehicles like cars, buses, planes, or helicopters. They can carry enough fuel to travel long distances.

Today most vehicles use gasoline or diesel as fuel. Some vehicles use biodiesel made from plant materials. There are also electric cars that use energy from batteries. Some vehicles, like bicycles, use human energy!

Discover!

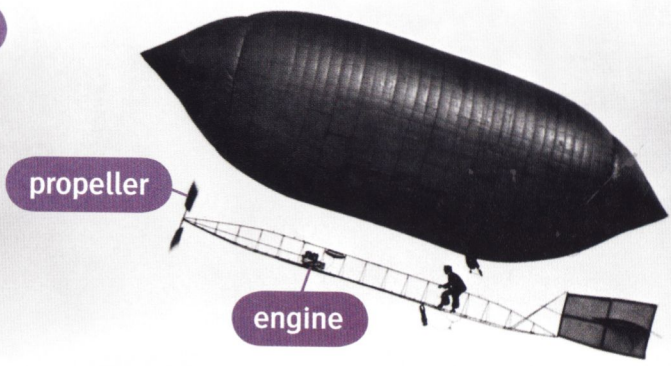
Electric cars are good for the environment. They don't produce smoke or pollution.

Go to pages 34–35 for activities.

7 Flying Machines

Today we can fly all over the world, but 200 years ago planes didn't exist. Some people flew in hot-air balloons. These balloons had no engines so they were slow and hard to control.

An Airship

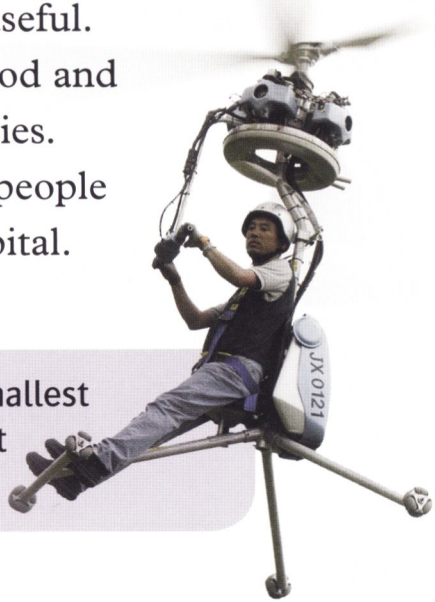


Later, people invented airships. They had engines and propellers, so they were faster and easier to control.

In 1903 Wilbur and Orville Wright invented the first plane. It was made of wood and carried one person. The first flight only lasted for 12 seconds! Four years later a French inventor named Paul Comu flew one of the first helicopters. He stayed in the air for about 20 seconds.

Today there are many types of plane. Some planes have propellers and others have jet engines. Some planes carry freight and others carry passengers. Some modern planes carry more than 850 passengers!

Helicopters are very useful. They can transport food and medicine in emergencies. They can also rescue people and take them to hospital.



Discover!

The *GEN H-4* is the smallest helicopter in the world. It carries one person!

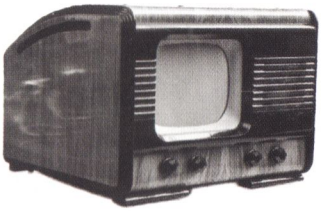
Go to pages 36–37 for activities.

8 Communications

For a long time, people sent messages on paper. Then people invented new machines to communicate more quickly and easily.

In 1876 Alexander Graham Bell invented the telephone. It transmitted sounds through wires.

In 1895 Guglielmo Marconi invented the radio. It transmitted sounds with no wires.



In 1926 John Logie Baird invented a way to transmit images and show them on a screen. It was the first television, but it only showed black and white images. Then 18 years later, inventors made a television that showed images in color.

Communications today are very different. We talk on cell phones that transmit sounds with no wires. We can send text messages, photos, and videos. Many cell phones are also music players, and they can connect to the Internet!

With modern televisions, we can receive programs by satellite. We can also watch DVDs. Some televisions are very big. There is a television in Japan that is 11 meters tall and 66 meters long!

Discover!

Some modern televisions can be almost as thin as paper!

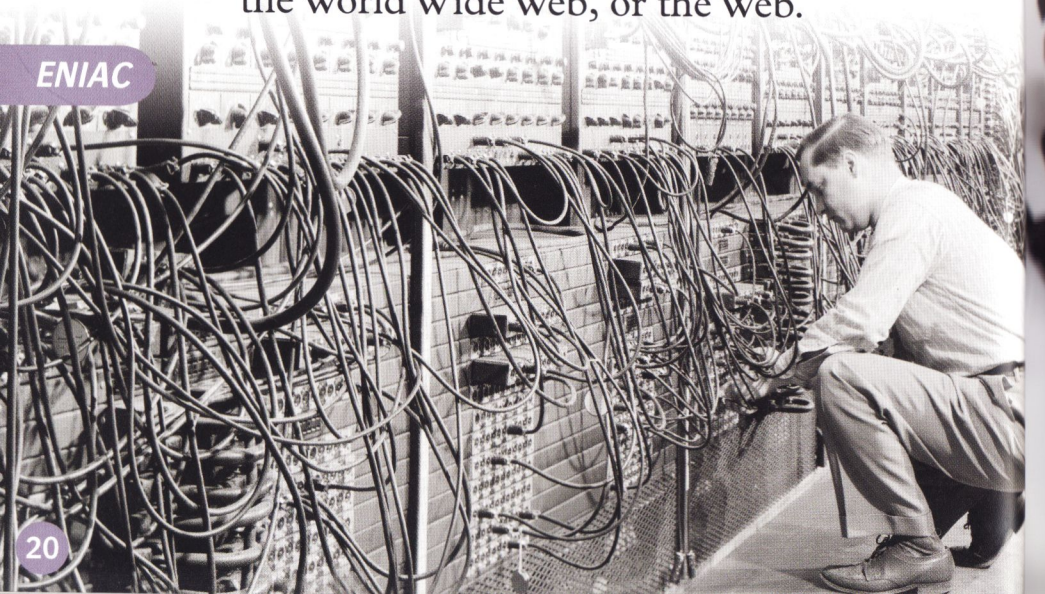
Go to pages 38–39 for activities.

Computers

People invented the first computers more than 60 years ago. Those computers were very different from computers today.

One of the first computers was called *ENIAC*. It was built in about 1946. *ENIAC* was big and heavy. It weighed about 30 metric tons! It was also expensive – it cost about 500,000 dollars!

Over the next 40 years computers became smaller and cheaper. From about 1980 people started using computers at home. Then in 1989 Tim Berners-Lee invented the World Wide Web, or the Web.



ENIAC

Computers today are very useful. You see images on a monitor and you use a keyboard to type words. You use a mouse to move the cursor and click on buttons. To connect to the Internet you use a modem.

Modern computers also have speakers so you can listen to music or watch movies. You need a printer to print documents, and to play computer games you need a joystick. What other things can computers do?

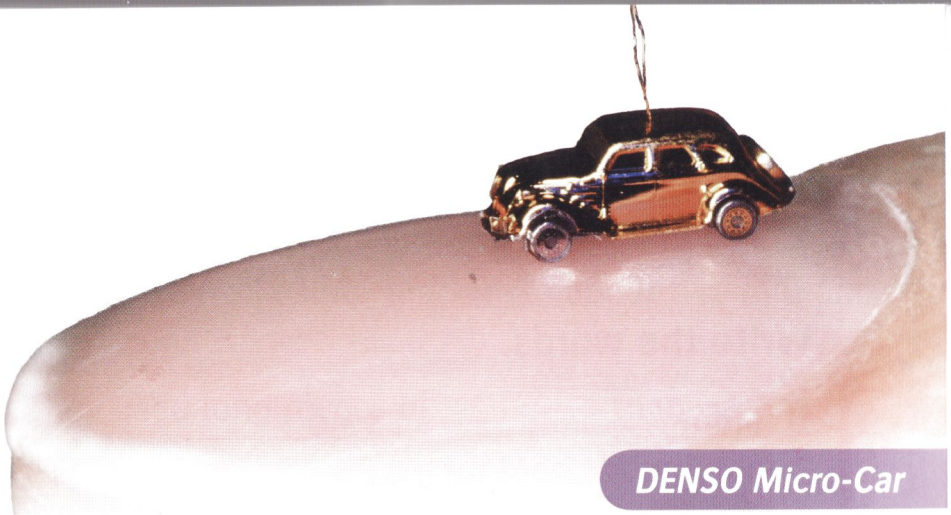
Go to pages 40–41 for activities.

Big and Small

With modern technology, we can build machines that are very big or very small.

The cruise ship *Oasis of the Seas* is one of the world's largest passenger vehicles. It's 65 meters high and 360 meters long. It carries 5,400 passengers. It has restaurants, shops, cinemas, and three swimming pools!

The *Bagger 288* is a mining machine. It's 96 meters high and 240 meters long. It's one of the world's heaviest land vehicles. It weighs 13,500 metric tons!

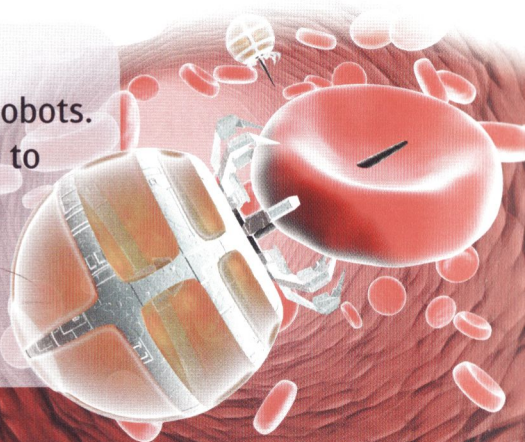


DENSO Micro-Car

The *DENSO Micro-Car* is one of the world's smallest machines. It's about 4.8 millimeters long and 1.7 millimeters high. It's smaller than a finger! The car can move, but its top speed is only 180 meters per hour. In the future people will use micro-machines like this to repair other machines from the inside.

Discover!

Scientists want to build micro-machines called nanobots. We will need a microscope to see them! Doctors will use them to help people who are sick. The nanobots will work inside their bodies.



Go to pages 42–43 for activities.

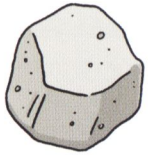
1 The First Machines

Read pages 4–5.

1 Write the words.

~~stone~~ wood bone metal

1 stone



3 _____

2 _____

4 _____

2 Complete the sentences.

1 The axe is made of stone and wood.

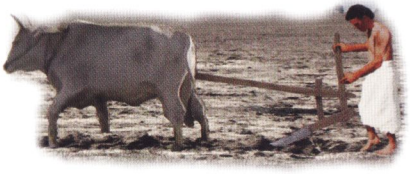
2 The knife is made of _____.

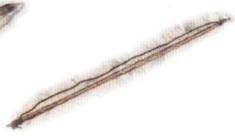
3 The lever is made of _____.

4 The plow is made of _____.

5 The arrow is made of _____.

6 The bow is made of _____.





3 Complete the sentences.

tools levers ~~machines~~ plows wood farming

1 People started using machines about two million years ago.

2 They used long pieces of _____ to make levers.

3 People started _____ for food about 7,000 years ago.

4 They invented farming machines like _____.

5 Some farmers used _____ to get water.

6 People started making metal _____ about 5,000 years ago.

4 Answer the questions.

1 What did people use to shoot arrows?

People used bows to shoot arrows.

2 What did people build to get water for their plants?

_____

3 How did people move heavy objects like rocks?

_____

4 When did people start making metal tools?

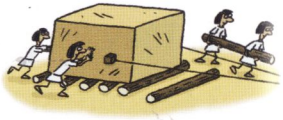
_____

2 Round and Round

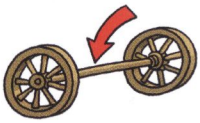
Read pages 6–7.

1 Write the words.

axle cart clay pot
rollers wheel car



1 _____ 2 _____ 3 _____



4 _____ 5 _____ 6 _____

2 Match. Then write sentences.

People used rollers	is a very big wheel.
An axle is a bar	to move heavy objects.
Potters used wheels	are vehicles with wheels.
The London Eye	that connects two wheels.
Carts and chariots	to make clay pots.

1 People used rollers to move heavy objects.

2 _____

3 _____

4 _____

5 _____

3 Write *true* or *false*.

1 People used the first wheel about 2,000 years ago. false

2 People made rollers from tree trunks. _____

3 Cars usually have wheels and axles. _____

4 The first wheels were made of metal. _____

5 The London Eye is 153 meters high. _____

4 Write the words.

1 vehicle

4 _____

2 _____

5 _____

3 _____

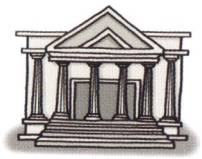
6 _____

3 Ramps and Cranes

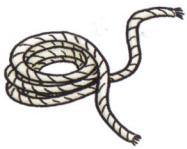
Read pages 8–9.

1 Write the words.

block crane pulley ramp rope temple



1 _____



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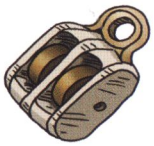
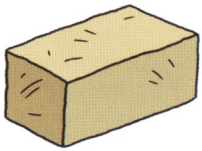


3 _____



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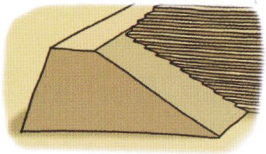

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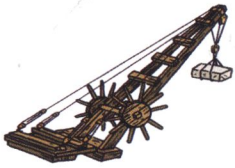


6 _____

2 Complete the sentences.

blocks cranes pulleys ramps ropes workers

1 The Egyptians used _____ to build pyramids.

2 The _____ of stone were very large and heavy.

3 The Egyptians needed rollers and many _____.

4 The Greeks used big _____ made of wood.

5 The Greeks had cranes with many ropes and _____.

6 The workers pulled the _____ and lifted the blocks.

3 Answer the questions.

1 What do ramps help us to do?

_____

2 Why did the Egyptians need many workers?

_____

3 How did the workers move the blocks up the ramps?

_____

4 Where is the biggest pyramid in Egypt?

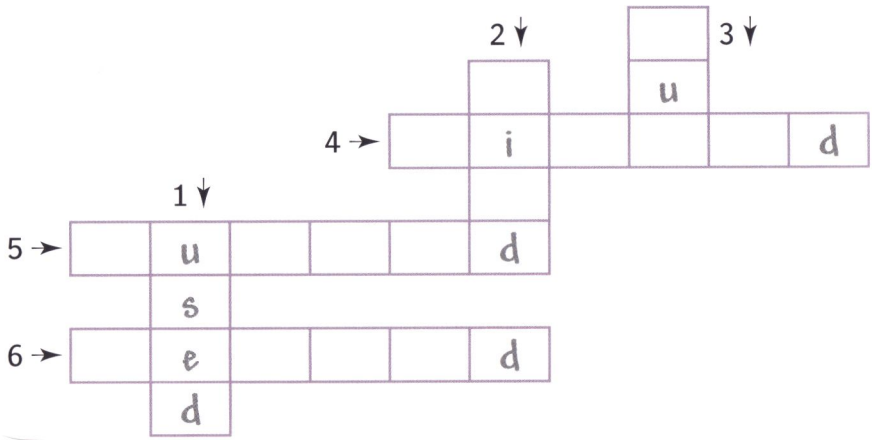
_____

5 How high is the biggest pyramid?

_____

4 Complete the puzzle.

The Greeks (1)___ cranes to build their temples. The workers (2)___ the ropes to blocks of stone. Then they (3)___ the ropes around the pulleys. The workers (4)___ the blocks when they (5)___ the ropes. The Greeks (6)___ workers, but not as many as the Egyptians.



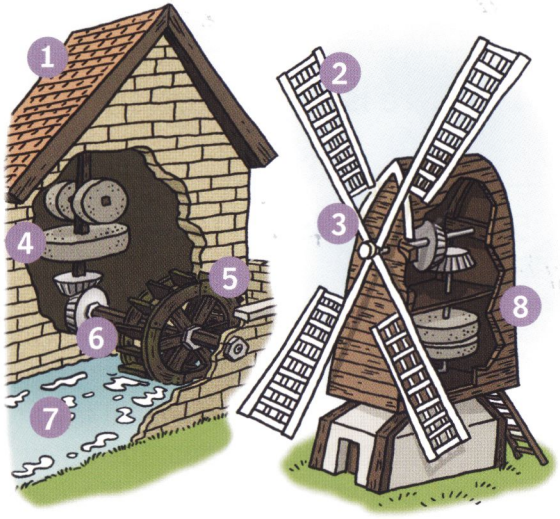
4 Water and Wind

Read pages 10–11.

1 Write the words.

arm axle river sail
millstone watermill
wheel windmill

1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____



2 Write *true* or *false*.

1 People use watermills to make bread. _____
2 Windmills only work when it's windy. _____
3 Watermills don't use energy from nature. _____
4 We can use windmills to produce electricity. _____
5 Watermills are useful in places with no rivers. _____
6 People used windmills thousands of years ago. _____

3 Complete the sentences.

arms axle grain flour
sails water wheel wind

1 Watermills can make grain into _____.

2 Watermills use energy from flowing _____.

3 A watermill has a large _____ on the outside.

4 The wheel turns an _____ inside the watermill.

5 Windmills use energy from the _____.

6 A windmill has long arms with big _____.

7 The _____ turn when the wind pushes the sails.

8 A millstone breaks the _____.

4 Complete the puzzle. Write the secret word.

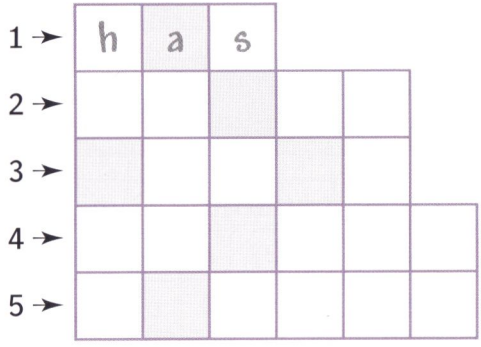
1 A watermill __ a wheel.

2 A windmill __ when it's windy.

3 The wheel __ a big axle.

4 The millstone __ the grain.

5 The wind __ a windmill's sails.



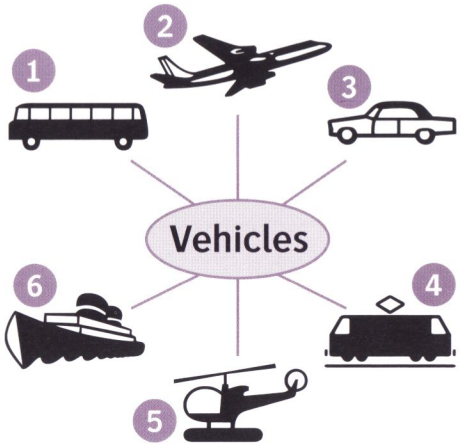
The secret word is: | | a | | | | |

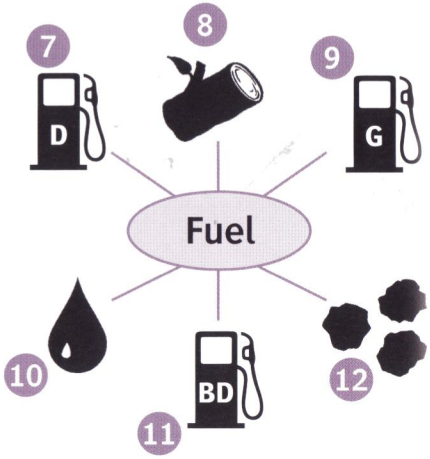
6 Engines and Energy

Read pages 14–15.

1 Write the words.

biodiesel boat bus car coal diesel oil
gasoline helicopter plane train wood





1 _____ 7 _____

2 _____ 8 _____

3 _____ 9 _____

4 _____ 10 _____

5 _____ 11 _____

6 _____ 12 _____

2 Order the words. Then write *true* or *false*.

1 long / can / Buses / distances. / travel

Buses can travel long distances. _____

2 many / use / Today / wood. / vehicles

_____ _____

3 cars / from / use / Electric / batteries. / energy

_____ _____

4 and / human / Trains / energy. / use / planes

_____ _____

5 from / made / is / materials. / Biodiesel / plant

_____ _____

3 Answer the questions.

1 What fuels do most vehicles use today?

_____

2 What vehicles don't produce smoke or pollution?

_____

3 What types of vehicles use human energy?

_____

4 What types of vehicles do you normally use?

_____

_____

5 Telling the Time

Read pages 12–13.

1 Write the words.

digital clock sand clock
mechanical clock sundial
water clock

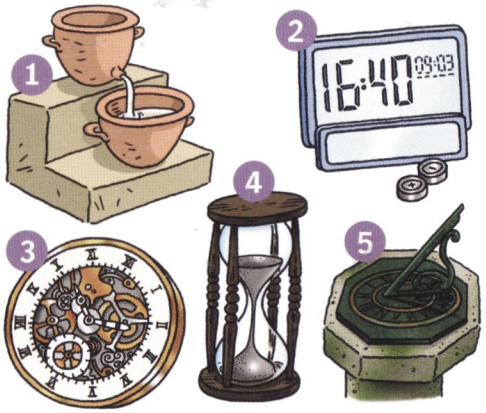
1 _____

2 _____

3 _____

4 _____

5 _____



2 Complete the chart.

batteries gears pots glass bubbles water
~~pendulum~~ pointer sand springs sun

Sundial	Water Clock	Sand Clock	Mechanical Clock	Digital Clock
			pendulum	

3 Write *true* or *false*.

1 A sundial's pointer makes a shadow to tell the time. _____

2 Sand clocks had glass bubbles with water in them. _____

3 On a digital clock we can see the time in numbers. _____

4 Most cell phones and computers have clocks in them. _____

5 In water clocks the water flows from the bottom to the top. _____

6 All mechanical clocks have gears and a pendulum. _____

4 Find and write the words.

j	d	i	g	i	t	a	l
v	b	s	a	n	d	t	k
s	a	r	u	l	w	o	m
p	t	e	s	t	m	w	e
r	t	b	u	b	l	k	c
i	e	m	n	u	r	c	h
n	r	u	d	b	n	o	a
g	i	n	i	b	h	l	n
o	e	x	a	l	c	c	i
p	s	a	l	e	t	s	c
s	c	y	r	p	a	z	a
s	h	a	d	o	w	q	l

1 digital _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

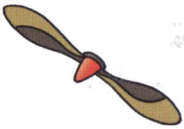
10 _____

7 Flying Machines

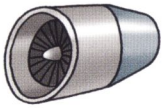
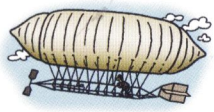
Read pages 16–17.

1 Write the words.

airship helicopter plane
jet engine propeller
hot-air balloon


1 _____ 2 _____ 3 _____

4 _____ 5 _____ 6 _____

2 Match. Then write sentences.

Hot-air balloons	powerful jet engines.
Helicopters can	exist 200 years ago.
Some planes have	be useful in emergencies.
Planes didn't	are slow and hard to control.

1 _____

2 _____

3 _____

4 _____

3 Write *true* or *false*.

1 Orville and Wilbur Wright invented the first jet plane. _____

2 The first plane flight in history was 12 seconds long. _____

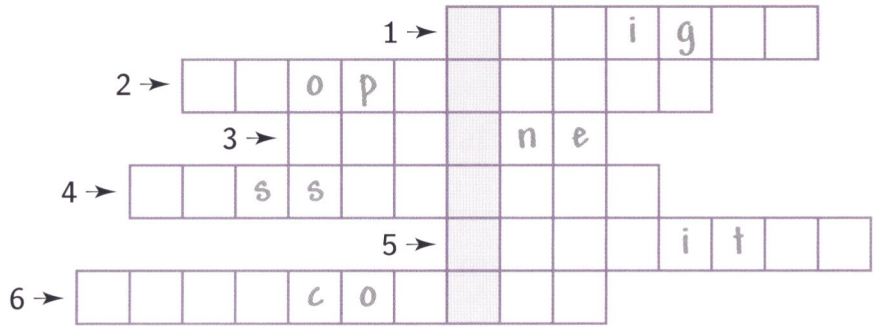
3 Paul Comu flew one of the world's first helicopters in 1903. _____

4 Comu's helicopter floated in the air for about 20 minutes. _____

5 The world's first plane only carried one person at a time. _____

4 Complete the puzzle. Write the secret word.

1 Some types of planes only carry ___.
2 Some planes have ___ to make them fly.
3 A hot-air balloon can fly but it doesn't have an ___.
4 Some big planes can carry 850 ___.
5 Helicopters can take people to ___.
6 The *GEN H-4* ___ can carry one person.



The secret word is: _____

8 Communications

Read pages 18–19.

1 Complete the sentences.

radios telephones televisions satellites sounds
cell phones images messages programs wires

1 Old _____ transmitted _____ through wires.
2 Old _____ showed black and white _____.
3 _____ can transmit sounds with no _____.
4 Modern _____ can send text _____.
5 Now _____ transmit lots of television _____.

2 Match. Then write sentences.

John Logie Baird	the telephone	in 1895
Guglielmo Marconi	the first television	in 1944
Inventors	the radio	in 1876
Alexander Graham Bell	the color television	in 1926

1 _____
2 _____
3 _____
4 _____

3 Find and write the words.

awavoeetcommunicatewsbphotoonowireen

messageadscreenoradioosoundgolimage

amtransmittinventnsatellitecfprogramm

communicate

4 Answer the questions.

1 How many televisions are there in your home?

2 How many people in your family have a cell phone?

3 What programs do you watch on television?

4 How often do you watch movies on DVD?

9 Computers

Read pages 20–21.

1 Write the words.

cursor joystick keyboard
modem monitor mouse
printer speaker headphones

1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____
9 _____

2 Circle the correct words.

1 The first computers were very **big** / **small** and heavy.
2 The *ENIAC* computer weighed **3** / **30** metric tons.
3 The *ENIAC* computer was very **cheap** / **expensive**.
4 From **1960** / **1980** people used home computers.
5 The **Web** / **modem** was invented in 1989.

3 Complete the sentences.

play games type words use the Internet watch movies
click on buttons print documents listen to music

1 You can _____ on the monitor.

2 You use a printer to _____.

3 You need a joystick to _____.

4 You _____ with the keyboard.

5 You use a mouse to _____.

6 You need a modem to _____.

7 You can _____ if you have speakers.

4 Answer the questions.

1 When was the *ENIAC* computer built?

_____

2 How much did the *ENIAC* computer cost?

_____

3 What did Tim Berners-Lee invent?

_____

4 What can we move with a mouse?

_____

5 What do you use a computer for?

_____

10 Big and Small

Read pages 22–23.

1 Write the numbers.

1.7 13,500 ~~96~~ 4.8 360 180 65 240 5,400

Bagger 288

96 meters high

___ meters long

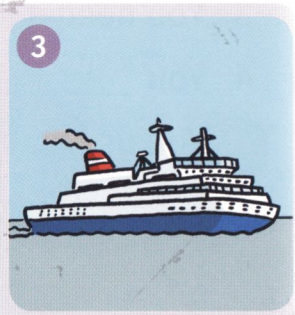
___ metric tons

Micro-Car

___ millimeters high

___ millimeters long

___ meters per hour



Oasis of the Seas

___ meters high

___ meters long

___ passengers

2 Write the words.

1 r^{c}u^{s}ie i^{h}s^{p} _____

2 n$_{i}$m$_{n}$i^{g} i$_{n}$amche _____

3 r^{i}cm^{i}c^{os}c^{o}p _____

4 s$_{ar}$p$_{n}$s^{e}g^{e} _____

5 ce$_{v}$hi$_{l}$e _____

6 ti$_{s}$c$_{s}$i$_{e}$n^{t}s _____

3 Write *true* or *false*.

1 The *Oasis* can carry lots of people. _____

2 The *Bagger* is a large passenger vehicle. _____

3 The *Oasis* is much taller than the *Bagger*. _____

4 Doctors will use nanobots to help people. _____

5 The *Micro-Car* can move, but it's not very fast. _____

6 Nanobots are bigger than the *Micro-Car*. _____

7 The *Bagger* is heavier than the *Micro-Car*. _____

8 The *Micro-Car* is bigger than a finger. _____

4 Answer the questions.

1 What type of machine is the *Bagger*?

_____

2 What will doctors use nanobots for in the future?

_____

3 How many swimming pools does the *Oasis* have?

_____

4 What big machines do you use?

_____

_____

5 What small machines do you use?

_____

_____

A Machines Survey

1 Write two more questions for the survey.

2 Interview your friends and family. Write ✓ for each answer.

	Yes	No
1 Can you ride a bicycle?		
2 Do you usually wear a watch?		
3 Do you have a computer at home?		
4 Are there windmills near your home?		
5 Do you sometimes walk up ramps?		
6 Do you have a digital clock?		
7 Do you send text messages?		
8 Does your family's car use biodiesel?		
9 Do you sometimes travel by plane?		
10 Do you play computer games?		
11		
12		

3 Count the answers. Make a summary to show your results. Display your results.

A Machine Poster

1 Find or draw pictures of a machine that you like.

2 Answer these questions and make notes.

What does the machine do?

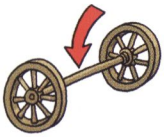
How does the machine work?

What can people use it for?

Who invented it? When?

3 Make a poster. Write sentences to describe the machine. Display your poster.

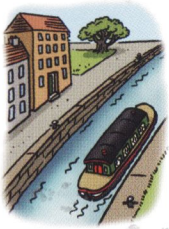
Picture Dictionary



axle

batteries

bone

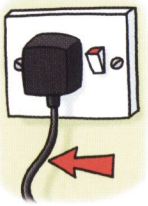


canal

cart

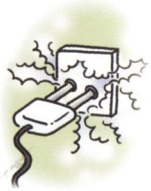
chariot

coal

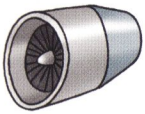


cord

cruise ship



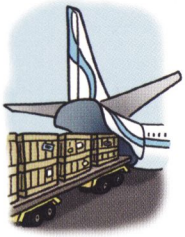
electricity



engine

flour

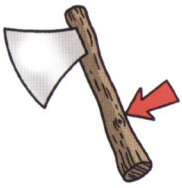
food



freight

fuel

grain



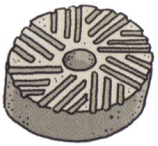
handle

hot-air balloon

medicine

metal

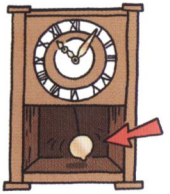
microscope



millstone

oil

passengers



pendulum

rope

sand clock

satellite

smoke

steam

stick

stone

temple

tools

tree trunk

water clock

wheel

wheelchair

wires

wood

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